Enterprise Application Development in the Cloud Workshop

v0.2

GRAND CANYON
UNIVERSITY

Introduction

- The next generation Development Platform for developing Enterprise Applications will be browser and cloud based.

- This Workshop will demonstrate what this Development Platform will look like and give students a hands on opportunity to experience this platform.

- The Development Platform will consist of the following components:

  ★ Cloud based IDE - Codenvy

  ★ Cloud based Development Runtimes - Codenvy

  ★ Cloud based Production Runtimes - Redhat OpenShift (on PaaS)

  ★ Cloud based Source Control System - Github

  ★ Cloud based Automated Build System - Redhat Openshift (using Jenkins)

  ★ Cloud based DevOps Automation - Jenkins, JUnit, Maven, JMeter (using flood.io)

Student Learning Objectives

- The Workshop will focus on the following learning objectives:

   ★ Teach students how to develop Enterprise Application using a Cloud based IDE

   ★ Teach students how to deploy Enterprise Application to a PaaS Cloud

   ★ Teach students how to build responsive applications using Bootstrap and Laravel Framework

   ★ Teach students how to build REST based API's using Spring Framework, Java, and Tomcat

   ★ Teach students how to build Performance Load Tests using JMeter and Flood.io

   ★ Teach students how to apply DevOps automation principles using Maven, JUnit, and Jenkins

Student Learning Opportunities

- The Reference Architecture used in the Workshop demonstrates MANY programming languages, frameworks, and tools already taught to our students as part of the GCU CSET Computer Programming program.

- The Reference Architecture used in the Workshop will provide a fantastic learning opportunity for the students by gaining hands on expertise with a number of additional new technologies.

Apply Prior Learned Knowledge
(Languages and Frameworks)

New Learning Opportunity:
(Languages and Frameworks)

New Learning Opportunity:
(Cloud and Tools)

Reference Architecture and SDK

• The Workshop will leverage a Reference Architecture as a teaching tool:

★ Fully functioning end to end system (using one IoT application and two enterprise applications)

★ Applications written in Java and PHP (languages the students already know)

★ Fully documented (providing an example of engineering rigor and discipline used to build a SDK)

★ Will be used as guide and for a reference within the class materials

★ Will provide the students with all the scaffolding to get their Cloud development started:

✓ Spring Frame application template (can be cloned from a GIT repository)

✓ Laravel Application application template (can be cloned from a GIT repository)

✓ Requirements and Documentation

✓ Step by step instructions for how to get started

NOTE: depending on the interest I am also thinking of building a Reference Architecture v2 using the MEAN s

Reference Applications

- The following applications will be built in the Workshop using the Cloud based Development Platform:

  ★ IoT Services App - Using Tomcat written in Java leveraging JAX-RS, JSON, and the Spring Framework

  ★ Reporting App - Responsive browser based written in PHP leveraging Bootrap (for responsive support), Guzzle (for HTTP Client for REST API), LavaCharts (for charting), and the Laravel Framework

    ✳ An IoT App using a Raspberry Pi 3 written in Python consuming a REST API published on the IoT Server will be available for use in the Development Platform. The IoT application will be developed on the standard Raspberry Pi development environment outside of the Workshop.

Student Activities

- The Workshop will be held as a series of weekly hands on Explore More sessions:

  ★ Students will be given an introduction to the Reference Architecture and SDK

  ★ Students will design and build the IoT back end based application using the Spring Framework

  ★ Students will design and build the Reporting front end application using the Laravel framework

  ★ Students will do all development in the Cloud using Codenvy and deploy to OpenShift:

    ❖ A Github account can be setup for free

    ❖ A Codenvy account can be setup for free

    ❖ A Redhat OpenShift developer account can be setup for free

    ❖ The students will simply need a laptop with only a browser installed

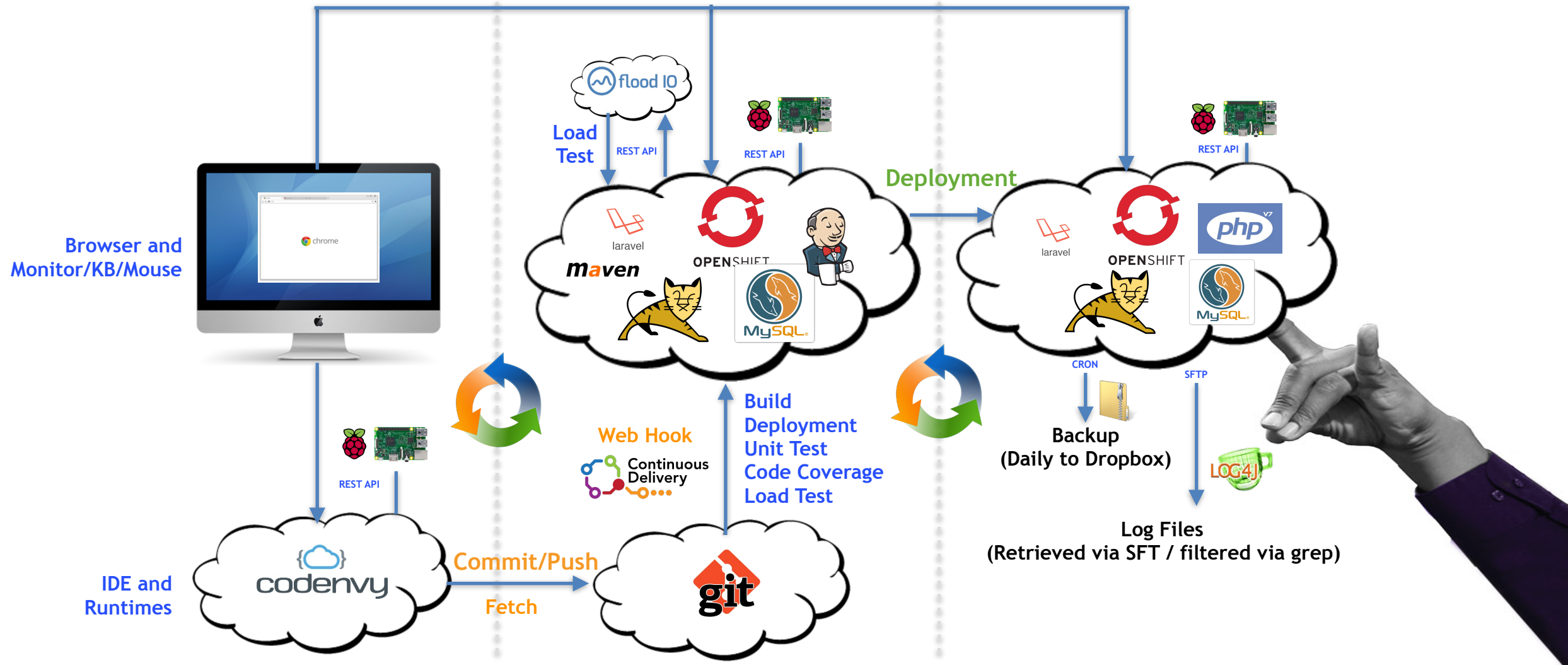   ❖ Note: My Raspberry Pi and IoT application will be provided for use in the Workshop
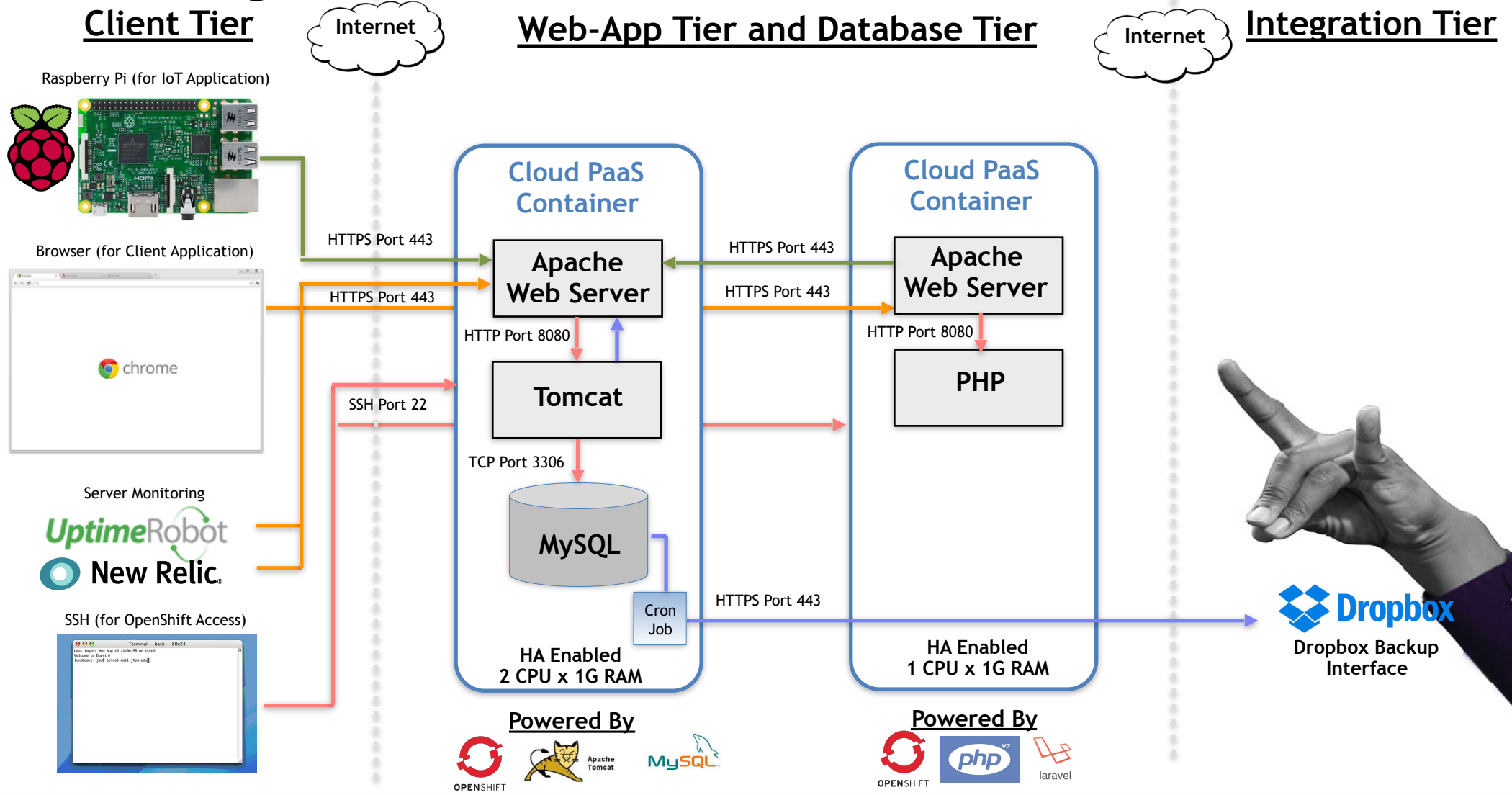
Cloud Based Development Platform

Physical Cloud Architecture

Client Tier　　Internet　　**Web-App Tier and Database Tier**　　Internet　　**Integration Tier**

Raspberry Pi (for IoT Application)

Browser (for Client Application)

Server Monitoring

SSH (for OpenShift Access)

Cloud PaaS Container

Apache Web Server

HTTPS Port 443

HTTPS Port 443

SSH Port 22

HTTP Port 8080

Tomcat

TCP Port 3306

MySQL

Cron Job

HTTPS Port 443

**HA Enabled
2 CPU x 1G RAM**

Powered By

Cloud PaaS Container

Apache Web Server

HTTPS Port 443

HTTP Port 8080

PHP

**HA Enabled
1 CPU x 1G RAM**

Powered By

Dropbox

Dropbox Backup Interface

IoT Services Application Logical Architecture
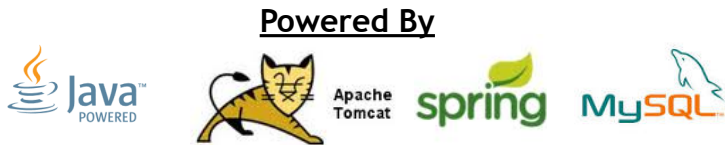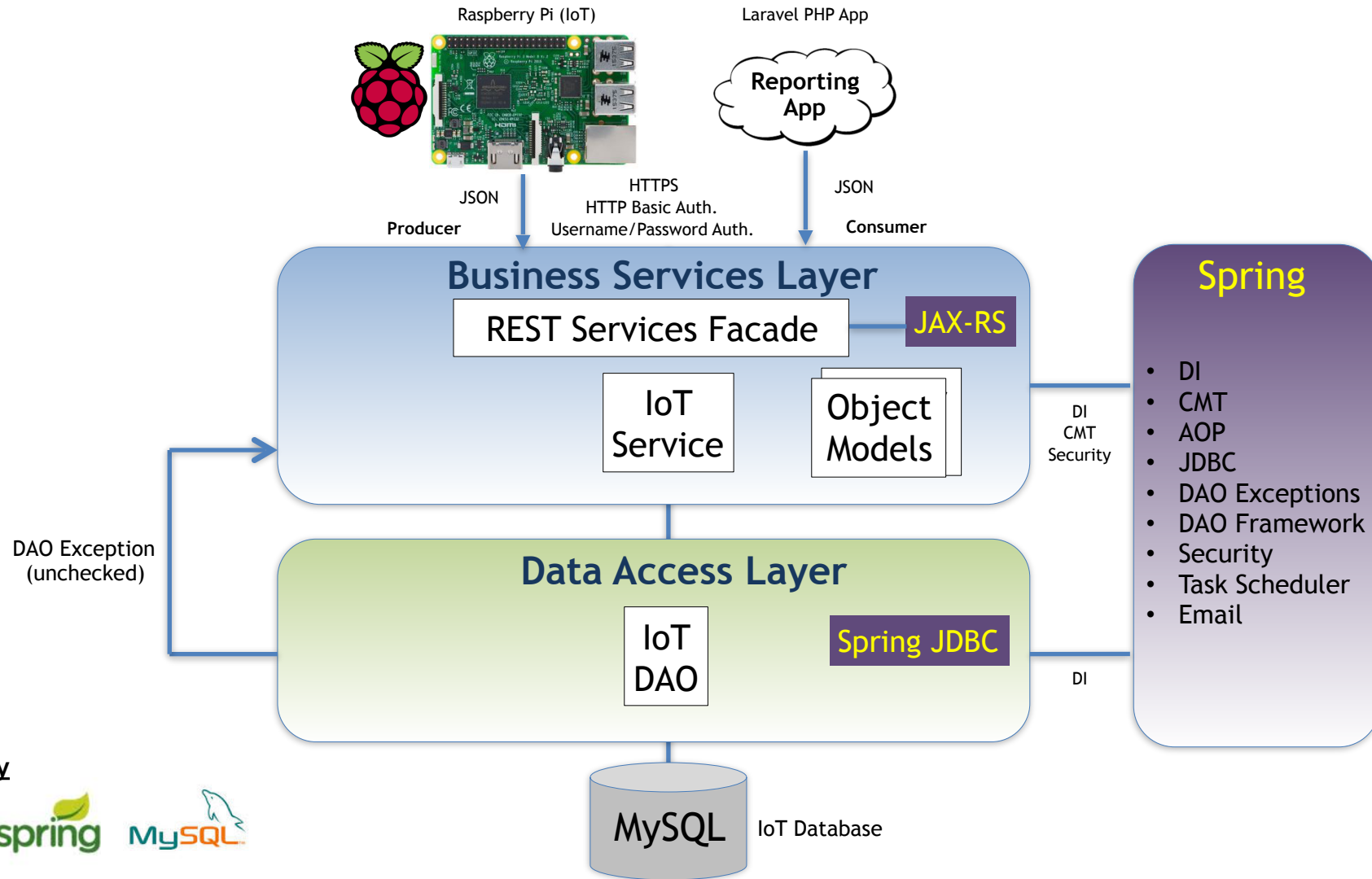
IoT Reporting Application Logical Architecture

Browser (for Client Application)

HTML

HTTPS
Username/Password Auth.

Presentation Layer

Laravel Controllers

Guzzle

LavaCharts

Bootstrap

IoT REST API
(Consumer)

HTTPS
HTTP Basic Auth.
Username/Password Auth.

Laravel
Views

Models

DI
MVC
Security

Laravel

- MVC
- Service Providers
- Security (optional)
- Custom Exceptions

Powered By

php v7

laravel
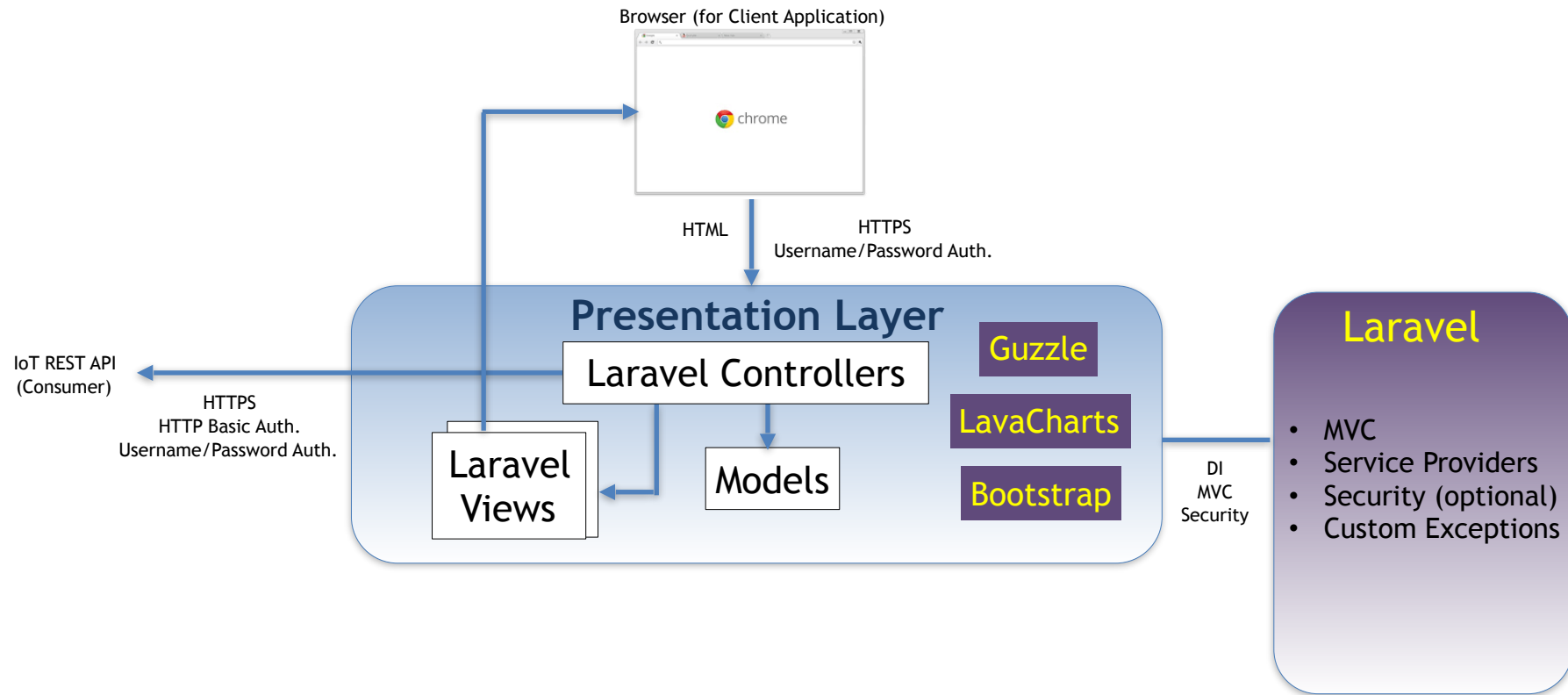
Next Steps and Call To Action

- The Workshop will engage current students:

  ★ I will seek volunteer students to work with me over the summer

  ★ To provide additional learning objectives and platform features that I did not think of yet

  ★ To help build and validate the Reference Architecture

  ★ To help build and validate the Reference Applications

  ★ To help create the SDK documentation

  ★ To help teach the Workshop (slated for fall Explore More)